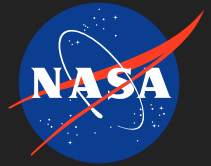


Swift Ultra Long Endurance (SULE) Unmanned Air Vehicle (UAV), Phase II

Completed Technology Project (2017 - 2022)

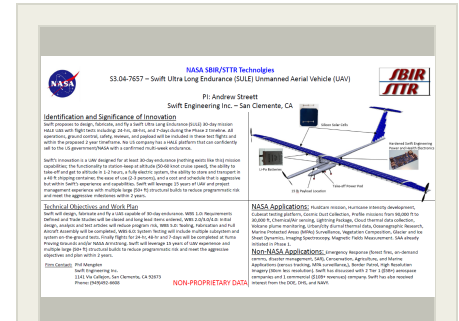


Project Introduction

Swift proposes to design, fabricate, and fly a Swift Ultra Long Endurance (SULE) 30-day mission HALE UAS with flight tests including: 24-hrs, 48-hrs, and 7-days during the Phase 2 timeline. All operations, ground control, safety, reviews, and payload will be included in these test flights and within the proposed 2 year timeframe. Zephyr is the only platform that has achieved HALE flights for over a week (14 days), however, it is based in the UK. No US company has a HALE platform that can confidently sell to the US government/NASA with a confirmed multi-week endurance. Without investment, the US will have to rely on the European-based Airbus/Qinetiq Zephyr solution. Swift's innovation is a UAV designed for at least 30-day endurance (nothing exists like this) mission capabilities; the functionality to station-keep at altitude (50-60 knot cruise speed), the ability to take-off and get to altitude in 1-2 hours, a fully electric system, the ability to store and transport in a 40 ft shipping container, the ease of use (2-3 persons), and a cost and schedule that is aggressive but within Swift's experience and capabilities. Swift will design, fabricate and fly a UAS capable of 30-day endurance with the possibility to exponentially decrease costs and increase data provided to industries. System testing will include multiple subsystem and system on-the-ground tests and flights for 24-hrs, 48-hrs and 7-days will be completed at Yuma Proving Grounds and/or NASA Armstrong. Swift will leverage 15 years of UAV and project management experience with multiple large (50+ ft) structural builds to reduce programmatic risk and meet the aggressive milestones within 2 years.

Anticipated Benefits

10 mission cases with direct support from NASA focals: (1) FluidCam mission, (2) Hurricane intensity development, (3) Cubesat testing platform, (4) Cosmic Dust Collection, (5) Profile missions from 90,000 ft to 30,000 ft, (6) Chemical/Air sensing, (7) Lightning Package, (8) Cloud thermal data collection, (9) Volcano plume monitoring, (10) Urban/city diurnal thermal data. In addition other NASA Earth Science missions that would benefit from this technology are: Oceanographic Research, Marine Protected Areas (MPAs) Surveillance, Tornado Monitoring, Cloud and Aerosol Measurements, Stratospheric Ozone Chemistry, Tropospheric Pollution/Air Quality, Water Vapor Measurements, O₂ and CO₂ Flux Measurements, Vegetation Composition, Aerosol and Precipitation Distribution, Glacier and Ice Sheet Dynamics, Antarctic Exploration Surveyor, Imaging Spectroscopy, Topographic LIDAR Mapping, Magnetic Fields Measurement, Surface Deformation Interferometry. There are so many NASA missions, that this is a small indication of the NASA market. Space Act Agreement - NASA JPL/NASA Ames/Swift Engineering Inc: A Space Act Agreement (SAA) has been started by Lance Christensen (NASA JPL) during Phase 1 due to the support of a platform like this (30-day UAV) that would benefit air quality sensing in the stratosphere. Swift Engineering expects that Phase II will utilize this SAA to



Swift Ultra Long Endurance (SULE) Unmanned Air Vehicle (UAV), Phase II Briefing Chart Image

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Project Transitions	3
Images	3
Technology Maturity (TRL)	3
Target Destinations	3

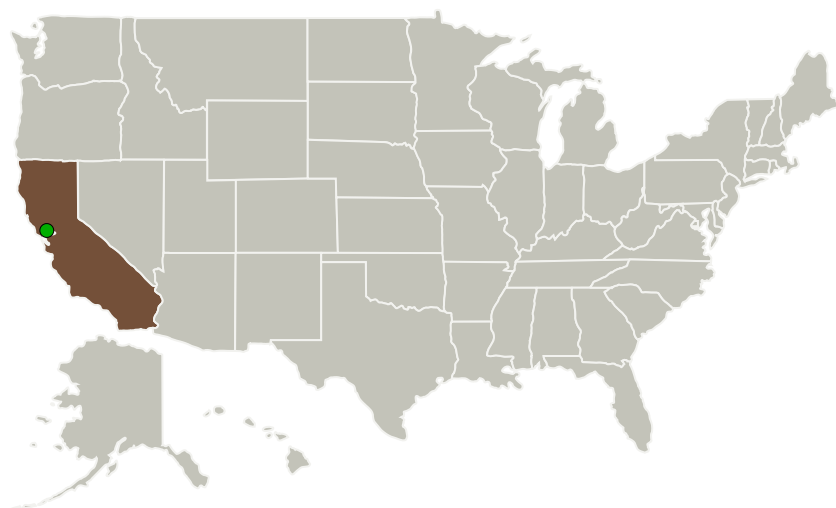
Swift Ultra Long Endurance (SULE) Unmanned Air Vehicle (UAV), Phase II

Completed Technology Project (2017 - 2022)



define a mission use case for future NASA work. Emergency Response: Events such as active volcano plume assessment, forest fire damage assessment, forest fire communications, pirate/coastal patrol, emergency on-demand communications, disaster assessment, and search and rescue. This technology can outpace satellites because it can be launched in a matter of hours to stare and manage large disaster/emergency response areas. Conservation, Agriculture, and Marine Applications: wildlife census and animal tracking, land resource management, crop disease tracking, mapping, agriculture yield maximization, and invasive plant assessment. Currently right now the US is spending time creating marine protected areas (MPAs). There are currently no cost-effective technologies that can monitor them. Agricultural fields need almost 4-in resolution on the ground and current public data (LandSat) can't provide that resolution. This technology can easily outpace satellite NRE company costs. Border Patrol: It takes \$12,255/hr to operate drones on the border. This technology is targeting \$1000/hr cost; an order of magnitude decrease for border patrol. High Resolution Imagery: Google recently (2014) acquired Skybox for \$500M to launch \$10M satellites using \$50M-\$90M rockets to get near real-time HD imagery of the earth; similar results for orders for magnitude less cost. Swift has discussed with 2 Tier 1 (\$5B+) aerospace companies and 1 commercial (\$10B+ revenues) company. Swift has also received interest from the DOE, DHS, and NAVY.

Primary U.S. Work Locations and Key Partners



Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Swift Engineering, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Managers:

Matthew M Fladeland
Ryszard L Pisarski

Principal Investigator:

Shawn Barge

Swift Ultra Long Endurance (SULE) Unmanned Air Vehicle (UAV), Phase II

Completed Technology Project (2017 - 2022)



Organizations Performing Work	Role	Type	Location
Swift Engineering, Inc.	Lead Organization	Industry	San Clemente, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

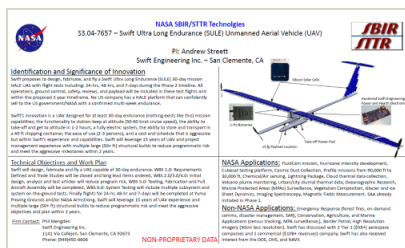
Primary U.S. Work Locations

California

Project Transitions

- April 2017:** Project Start
- September 2022:** Closed out

Images

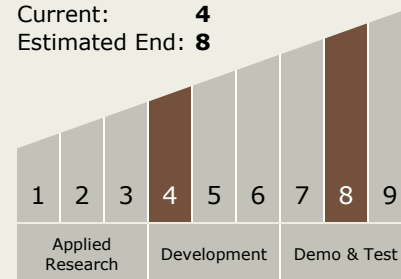


Briefing Chart Image

Swift Ultra Long Endurance (SULE) Unmanned Air Vehicle (UAV), Phase II Briefing Chart Image (<https://techport.nasa.gov/image/129065>)

Technology Maturity (TRL)

Start: 4
Current: 4
Estimated End: 8



Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System